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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/043,786	01/10/2002	Satoshi Seo	07977/291001/US5434	9114

7590 05/07/2004

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EXAMINER

ROY, SIKHA

ART UNIT PAPER NUMBER

2879

DATE MAILED: 05/07/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

### Application No.

10/043,786

### Applicant(s)

SEO ET AL.

### Examiner

Sikha Roy

### Art Unit

2879

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 03 February 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 2-31, 33-35, 37 and 39-47 is/are pending in the application.
- 4a) Of the above claim(s) 48-53 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 2-31, 33-35, 37 and 39-47 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date 1003, 1203.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☒ Other: 0104.

### **DETAILED ACTION**

The Amendment, filed on February 3, 2004 has been entered and is acknowledged by the Examiner.

Cancellation of claims 1, 32, 36 and 38 has been entered.

### ***Election/Restrictions***

Applicants' election without traverse of Group I is acknowledged.

Claims 48-52 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected Group II, there being no allowable generic or linking claim.

### ***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 2, 3, 25, 30, 31, 39-42, 45 and 47 are rejected under 35 U.S.C. 102(e) as being anticipated by U.S. Patent 6,392,250 to Aziz et al. ('250).

Referring to claim 2 Aziz ('250) discloses (column 5 lines 10-30, column 8 lines 19-32 Fig. 2) organic light emitting device 30 comprising an anode 34, a cathode 42, an

Art Unit: 2879

organic compound layer 38 interposed between the anode and the cathode comprising a hole transport compound and an electron transport compound, wherein the hole transport material includes polyaniline a high molecular weight compound. Aziz discloses the mixed region 38 in which two compounds for hole transport and electron transport materials are mixed is located apart from the anode and cathode.

Furthermore Aziz discloses the mixed region further comprises third material (dopant) doped as guest while the hole transport and electron transport compounds are hosts.

Regarding claim 3 Aziz ('250) discloses (column 5 lines 25-28) the guest luminescent compound (dopant) demonstrate light emission (acting as emitter).

Regarding claim 25 Aziz('250) discloses organic light emitting device comprising an anode, a cathode, an organic compound layer interposed between the anode and the cathode comprising a first organic compound (polyaniline for hole transport material) which is a high molecular weight compound and a second organic compound (stilbene derivative, tris(8-hydroxyquinolate) aluminum ( $Alq_3$ ) - for electron transport material) which is a low molecular compound, the first and second compounds are mixed in the mixed region. Aziz('250)further discloses (column 8 lines 19-25) the high molecular weight compound (hole transport material) includes polyphenylene derivative.

Regarding claim 30 Aziz discloses the first organic compound a hole transport compound and the second organic compound ( $Alq_3$ ) known as light emitting compound.

Regarding claim 31 Aziz discloses (column 8 lines 19-32) the first organic compound is selected from polyaniline, and its acid-doped forms, poly (phenylene

Art Unit: 2879

vinylene), porphyrin derivatives which are high-molecular weight compounds inherently including pi electrons.

Regarding claim 39 Aziz discloses all the limitations which are same as in claim 25 and also a third organic compound (column 10 lines 63-67), a dopant material different from the first and second organic compounds doped as a guest in the mixed region.

Claim 40 essentially recites the same limitation as of claim 2 and hence is rejected for the same reason.

Regarding claims 41, 42, 45 and 47 Aziz ('250) discloses (column 11 line 61 through column 12 line 3) the third organic luminescent compound is selected from metal complex having platinum as central metal (PtOEP) and a metal complex having iridium ( $\text{Ir(ppy)}_3$ ) as central metal which inherently demonstrate light emission from a triplet state as evidenced by "High Quantum Efficiency in Organic Light-Emitting Devices with Iridium-Complex as Triplet Emissive Center" by Tsutsui et al. (Literature 8).

Claims 4, 9-17 are rejected under 35 U.S.C. 102(e) as being anticipated by U.S. Patent Publication 2003/0132704 to Aziz et al. ('704).

The Examiner notes that U.S. Patent Publication 2003/0132704 to Aziz et al. is a Division of application 09/629,163 which has filing date of July 31, 2000 and hence is available as prior art 102(e) reference. It is recognized that the two applications have

Art Unit: 2879

the same disclosure and U.S. PG Pub 2003/0132704 to Aziz et al. ('704) is only used for referencing the elements of the claims.

Regarding claim 4 Aziz ('704) discloses (Fig. 3 [0034], [0035]) an organic light emitting device 200 comprising an anode 214, a cathode 218 and an organic compound layer interposed between the anode and the cathode comprising a first organic compound, polyaniline, polythiophene, a hole transport material ([0067]) and a second compound, polyfluorenes an electron transport material ([0075]) both being high molecular weight compounds and different from each other. Aziz ('704) further discloses a mixed region 224 where the first and second organic compounds are mixed.

Regarding claim 9 Aziz('704) discloses first compound is a hole transport compound and the second organic compound, polyfluorenes demonstrate light emission ([0067],[0056]).

Regarding claims 10 and 11 Aziz('704) discloses the first organic compounds are polyanilines, polythiophenes, polyarylamines and their derivatives which are high molecular weight compounds, chemically doped and inherently include pi electrons.

Regarding claim 12 Aziz ('704) discloses the second compound is polyfluorene derivative.

Regarding claims 13-15 Aziz ('704) discloses (claims 7,8, [0054]) first organic compound is an electron transport material having high molecular weight including pi electrons and the second compound is a light emitting material selected from a group consisting of poly(p-phenylenevinylene).

Art Unit: 2879

Regarding claim 16 Aziz ('704) discloses ([0077]) the mixed region 224 comprises a third organic compound different from first and second organic compounds which is a dopant material.

Regarding claim 17 Aziz ('704) discloses ([0035], [0036], [0037]) the first organic compound is a hole transport material, second organic compound is an electron transport material and the third organic compound is light emitting dopant material. Aziz further discloses the suitable dopant materials can be selected from fluorescent dyes or phosphorescent material demonstrating light emission.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 5-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. PG Pub 2003/0132704 to Aziz et al. ('704) and further in view of U.S. Patent 5,925,980 to So et al.

Claim 5 differs from Aziz ('704) in that Aziz ('704) does not exemplify the concentration of the first and second organic compounds changing continuously in the mixed region.

So in analogous art of organic electroluminescent device with graded region discloses (abstract) the graduated region between the hole transporting region and electron transporting region changes continuously in the mixed region. So further discloses (column 4 lines 13-25) because of continuous change from hole transporting to electron transporting organic material the two materials are intermixed and disseminated so that no fixed interface is formed and adhesion problem of the two layers is resolved. The mixed region appears as a single layer of material which cannot separate and generally allows a smooth movement of carriers there across. This results in an improved organic electroluminescent device with improved reliability and operation (column 1 lines 60-65).

Therefore it would have been obvious to one of ordinary skill in the art at the time of invention to modify the mixed region of Aziz ('704) as continuous region as taught by So for resolving the problem of adhesion of two organic layers, smooth movement of carriers across the mixed region and resulting in an improved organic electroluminescent device with improved reliability and operation.

Claim 6 essentially recites the same limitations as of claim 5 and hence is rejected for the same reason. The recitation of continuous change in the first and second organic compounds in the mixed region is detected by SIMS has not been given patentable weight because it is considered as an intended use recitation. It has been held that a recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus satisfying the claimed structural limitations.



Art Unit: 2879

Regarding claims 7 and 8 Aziz ('704) discloses ([0068], [0069], [0070]) first and second organic compounds comprise elements of Group 15 to Group 17 selected from group consisting of nitrogen, oxygen, chlorine, fluorine.

Claims 18, 19, 22, 24, 33-35 and 37 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. PG Pub 2003/0132704 to Aziz et al. ('704) and further in view of U.S. Patent 6,392,250 to Aziz et al.('250).

Regarding claims 18 and 19 Aziz ('704) does not disclose the third organic luminescent compound having a metal complex having platinum or iridium as central metal which demonstrates light emission from triplet excited state.

Aziz('250) in analogous art of organic light emitting devices discloses (column 11 line 61 through column 12 line 3) the third organic luminescent compound is selected from metal complex having platinum as central metal (PtOEP) and a metal complex having iridium ( $\text{Ir(ppy)}_3$ ) as central metal which inherently demonstrate light emission from a triplet state as evidenced by " High Quantum Efficiency in Organic Light-Emitting Devices with Iridium-Complex as Triplet Emissive Center" by Tsutsui et al. (Literature 8). It is to be noted that this emitters having high quantum efficiency of phosphorescence from triplet state provide high efficient light source.

Therefore it would have been obvious to one of ordinary skill in the art at the time of invention to include luminescent compounds having platinum or iridium as central metal having light emission from triplet state as taught by Aziz ('250) in the third organic compound of dopant material of Aziz ('740) for providing light source with high efficiency.

Art Unit: 2879

Regarding claim 22 Aziz ('250) discloses the third organic compound a metal complex comprising a metal element.

Regarding claim 24 Aziz ('250) discloses the metal element selected from group consisting of platinum and iridium.

Regarding claims 33 and 34 Aziz ('250) discloses Alq<sub>3</sub> as light emission material but does not disclose first organic compound with high molecular weight as electron transport compound.

Aziz ('704) discloses high molecular weight compound polydialkylfluorene (polyfluorenes) as electron transport material.

Selection of known material for a known purpose is within the skill of the art. Therefore it would have been obvious to ordinary skill in the art at the time of invention to use high molecular weight compound, the first compound of Aziz ('250) as electron transport material as suggested by Aziz ('704) because the selection of known materials for a known purpose is within the skill of the art.

Regarding claim 35 Aziz ('704) discloses polyfluorene, the high molecular weight compound as luminescent material and second organic compound with low molecular weight (aromatic tertiary amines) as hole transport compound.

Regarding claim 37 Aziz ('250) and Aziz ('704) disclose first high molecular weight compound polyfluorene, as luminescent material and second organic compound Alq<sub>3</sub> as electron transport compound.

Art Unit: 2879

Claims 20 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. PG Pub 2003/0132704 to Aziz et al. ('704) and further in view of U.S. 5,281,489 to Mori et al.

Regarding claim 21 Aziz ('704) does not disclose third organic compound selected from group consisting of phenanthroline derivative, oxadiazole and triazole derivative.

Mori in same field of endeavor of electroluminescent element discloses (column 23 line 59, column 24 lines 60-67) fluorescent dyes including phenanthroline derivative, oxadiazole compounds.

The selection of known materials for a known purpose is generally considered to be within the skill of art. Therefore it would have been obvious to one of ordinary skill in the art at the time of invention to include fluorescent dyes including phenanthroline derivative, oxadiazole compounds because the selection of known materials for a known purpose is within the skill of the art.

Regarding claim 20 the third organic compounds such as oxadiazole compounds as disclosed by Mori inherently possess larger energy difference between a highest occupied molecular orbital and a lowest unoccupied molecular orbital than first and second organic compounds.

Claim 23 is rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. PG Pub 2003/0132704 to Aziz et al. ('704) and U.S. Patent 6,392,250 to Aziz et al. and further in view of U.S. Patent 6,566,807 to Fujita et al.

Art Unit: 2879

Regarding claim 23 Aziz ('704) and Aziz ('250) do not disclose the organometallic compound in the third organic compound selected from group consisting of aluminum, zinc and beryllium.

Fujita in analogous art of organic electroluminescent element discloses (column 8 lines 21-26) fluorescent organometallic compound such as azomethine zinc complex.

The selection of known materials for a known purpose is generally considered to be within the skill of art. Therefore it would have been obvious to one of ordinary skill in the art at the time of invention to include azomethine zinc complex containing zinc as suggested by Fujita in organometallic compound of Aziz('704) and Aziz('250) because the selection of known materials for a known purpose is within the skill of the art.

Claims 26 - 29 rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. patent 6,392,250 to to Aziz et al. ('250) and further in view of U.S. Patent 5,925,980 to So et al.

Claims 26,27 essentially recite the same limitations as of claims 5,6 respectively and hence are rejected for the same reason (see rejection of 5,6).

Regarding claims 28 and 29 Aziz ('250) discloses first and second organic compounds comprise elements of Group 15 to Group 17 selected from group consisting of nitrogen, oxygen, chlorine, fluorine.

Art Unit: 2879

Claims 43 and 44 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. patent 6,392,250 to Aziz et al. ('250) and further in view of U.S. Patent 5,281,489 to Mori et al.

Claims 43 and 44 essentially recite the same limitations as of claims 20 and 21 respectively and hence are rejected for the same reason.

Claim 46 is rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. patent 6,392,250 to Aziz et al. ('250) further in view of U.S. Patent 6,566,807 to Fujita et al.

Claim 46 essentially recites the same limitation of claim 23 and hence is rejected for the same reason.

### ***Response to Arguments***

Applicant's arguments with respect to claims 2,4,25 and 39 have been considered but are moot in view of the new ground(s) of rejection.

In response to applicants' argument that 'stilbene' is a monomer and not a compound with high molecular weight the examiner notes that specification does not provide any definition of high molecular weight compound. The specification only discloses examples of high-molecular compounds and their function as charge carrier in an organic light emitting element.

Art Unit: 2879

### ***Conclusion***

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

### ***Contact Information***


Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sikha Roy whose telephone number is (571) 272-2463. The examiner can normally be reached on Monday-Friday 8:00 a.m. – 4:30 p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nimeshkumar D. Patel can be reached on (571) 272-2457. The fax phone number for the organization is (703) 308-7382.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

S.R.

Sikha Roy

  
**ASHOK PATEL**  
**PRIMARY EXAMINER**